

## The University of Jordan

Faculty: Pharmacy  
Program: Pharm D

Department: Clinical Pharmacy  
Academic Year/ Semester : Second

### 1213302 Immunology & Genetics علم المناعه والوراثة

Credit hours	3	Level	Third	Pre-requisite	١٢.٣٢٥٣
Coordinator/ Lecturer	د. اريج عساف	Office number	١٣٢	Office phone	٢٣٣٦٣
Course website		E-mail	Areej_assaf@ju.edu.jo	Place	Faculty of Pharmacy

Office hours					
Day/Time	Sunday	Monday	Tuesday	Wednesday	Thursday

### Course Description

This course is made of 1 credit hour medical genetics course and 2 credit hours Immunology course. The Medical genetics course provides students with knowledge of basic principles of human medical genetics, types and disorders. The Immunology course provides the ground knowledge and ability to give the student a broad understanding of the immune system and its functions. Topics include: activation and regulation of innate and adaptive immunity and the principles governing vaccination; the molecular basis of antigen specificity; antibody structure and interaction with antigens; disorders of the immune system; tumor and transplantation immunology.

The syllabus is covered in a program of lectures.

## **Learning Objectives**

After completion of this course the student will be able to:

### **For the medical genetic course:**

#### **Have an understanding of the role of genetic factors in health and disease**

- Understand how changes to DNA and chromosomes can affect gene function or dosage
- Understand the Chromosomes and chromosome abnormalities
- Understand the Single gene (Mendelian) inheritance disorders and the Polygenic and Multifactorial Disorders
- Understand the use of polymorphisms as genetic markers
- Be aware of the role of both genetic and environmental factors in multifactorial conditions such as congenital anomalies, cancer, diabetes and psychiatric illness
- Be aware of genes of population and mapping of the genes.

#### **Be able to identify patients with, or at risk of, a genetic condition**

- Be able to take a family history and construct and interpret a pedigree
- Understand the clinical implications of the following genetic phenomena: incomplete penetrance, variation in expression, anticipation and new mutations
- Be aware of the possibility of heterogeneity in a genetic disease and the potential impact on diagnosis
- Understand the principles of risk estimation in Mendelian disease
- Be aware of examples of clinical indicators that suggest an inherited predisposition to cancer

#### **Be able to describe clinical features of common genetic disorders.**

- Understand the genetics of behavior
- Understand the genetics of immunity
- Understand the genetics of cancer
- Be aware of the genes and biochemistry; in born errors of metabolism
- Be aware of the genes on the drugs and treatment; pharmacogenetics
- Understand genetic testing and gene therapy.

### **For the immunology course:**

The expected learning outcomes of this course is to attain a working knowledge of current immunological principles as they relate to the cells and molecules of the immune system, how they interact in defending the body

against invading microorganisms, how they develop and acquire the ability to recognize antigens, and finally how they malfunction in autoimmune diseases and how they become inadequate in immune deficiency states. Furthermore, students will extend and solidify their understanding of the presented principles through critical readings from the primary research literature. Reading of research papers will help introduce students to research techniques and also help them appreciate the value of scientific research.

**Intended Learning Outcomes (ILOs):**

Successful completion of the course should lead to the following outcomes:

**A. Knowledge and Understanding:** Student is expected to

A1- Understand the genetic disorders and diseases.

A2- Knowledge and Understanding of Immunology:

a.1 Outline the key components of the innate and adaptive immune responses.

a.2 Describe which cell types and organs are involved in an immune response and the cytokines released.

a.3 Describe the basic structure of the cellular receptors and discuss their interactions during an immune response.

a.4 Differentiate between different Hypersensitivity states.

a.5 Understand and differentiate between primary and acquired immunodeficiency.

a.6 Identify the main mechanisms of immune tolerance and autoimmunity.

a.7 Understand the principles governing vaccination and the mechanisms of protection against disease.

a.8 Understand the concepts of tumor immunology, transplantation and immunotherapy.

**B. Intellectual Analytical and Cognitive Skills:** Student is expected to

B1- Explain the different types of disorders related to the chromosomes and genes.

B2- Explain how the immune system recognizes foreign antigen and the significance of self/non-self discrimination.

**C. Subject-Specific Skills:** Student is expected to

C1- Students will be encouraged to read widely and to research the various topics using the assigned texts, libraries and relevant web sites

C2- The use of other information resources is essential if students are to gain maximum benefit from their studies.

C3- This approach to the subject is in part designed to encourage students to be more responsible for their own learning and to become life long learners

**D. Transferable Key Skills:** Students is expected to

D1- Develop of problem solving and critical thinking skills.

D2-Use oral communication to effectively transmit ideas and conclusions to a scientific audience

D3- Use of videos and animation to effectively understand the concepts.

D4- The ability to use simple word and IT skills (i.e., data processing, software, internet, and multimedia) and the library to find information.

D5- The ability to be self-motivated learners and responsive to feedback.

D6- Working in team (i.e., sharing presentations and discussions and solving problem).

D7- Enhancement of research capability through working in independent projects.

### **ILOs: Learning and Evaluation Methods**

<b>ILO/s</b>	<b>Learning Methods</b>	<b>Evaluation Methods</b>
A. Knowledge and Understanding	<b>Lectures and Discussions, Video simulations in addition to class problems</b>	<b>Exam, Quiz, assignments</b>
B. Intellectual skills (cognitive and analytical)		
C. Subject-Specific Skills:		
D. Transferable Skills:		

### **Course Contents**

<b>Content</b>	<b>Reference</b>	<b>Week</b>	<b>ILO/s</b>
<b>Genetics</b>			
1. Introduction	<b>1 &amp; 2</b>	1 <sup>st</sup>	<b>A,B,C &amp;D</b>
2. Chromosomes and chromosome abnormalities	<b>1 &amp; 2</b>	1 <sup>st</sup>	<b>A,B,C &amp;D</b>
3. Single gene (Mendelian) inheritance disorders	<b>1 &amp; 2</b>	2 <sup>nd</sup>	<b>A,B,C &amp;D</b>
4. Polygenic and Multifactorial Disorders	<b>1 &amp; 2</b>	2 <sup>nd</sup>	<b>A,B,C &amp;D</b>
5. Mutation and human disease	<b>1 &amp; 2</b>	2 <sup>nd</sup>	<b>A,B,C &amp;D</b>

6. Genes in Populations	<b>1 &amp; 2</b>	3 <sup>rd</sup>	<b>A,B,C &amp;D</b>
7. Mapping disease loci	<b>1 &amp; 2</b>	3 <sup>rd</sup>	<b>A,B,C &amp;D</b>
8. The genetics of behavior	<b>1 &amp; 2</b>	4 <sup>th</sup>	<b>A,B,C &amp;D</b>
9. Genes and biochemistry; biochemical genetics	<b>1 &amp; 2</b>	4 <sup>th</sup>	<b>A,B,C &amp;D</b>
10.Genetics of cancer	<b>1 &amp; 2</b>	5 <sup>th</sup>	<b>A,B,C &amp;D</b>
11.Genes and drugs and treatment; pharmacogenetics	<b>1 &amp; 2</b>	5 <sup>th</sup>	<b>A,B,C &amp;D</b>
12.Genetics of immunity	<b>1 &amp; 2</b>	6 <sup>th</sup>	<b>A,B,C &amp;D</b>
13.Genetic testing and gene therapy	<b>1 &amp; 2</b>	6 <sup>th</sup>	<b>A,B,C &amp;D</b>
<b>Immunology</b>			
1. Introduction to the immune system and innate Immunity	<b>3 &amp; 4</b>	7 <sup>th</sup>	<b>A,B,C &amp;D</b>
2. Adaptive (acquired) Immunity.	<b>3 &amp; 4</b>	9 <sup>th</sup>	<b>A,B,C &amp;D</b>
3. Cytokines	<b>3 &amp; 4</b>	10 <sup>th</sup>	<b>A,B,C &amp;D</b>
4. Vaccines (Immunization)	<b>3 &amp; 4</b>	10 <sup>th</sup>	<b>A,B,C &amp;D</b>
5. Hypersensitivity reactions. Types I and II	<b>3 &amp; 4</b>	11 <sup>th</sup>	<b>A,B,C &amp;D</b>
6. Hypersensitivity reactions. Types III and IV	<b>3 &amp; 4</b>	12 <sup>th</sup>	<b>A,B,C &amp;D</b>
7. Autoimmunity	<b>3 &amp; 4</b>	12 <sup>th</sup>	<b>A,B,C &amp;D</b>
8. Primary Immunodeficiency	<b>3 &amp; 4</b>	13 <sup>th</sup>	<b>A,B,C &amp;D</b>
9. Acquired Immunodeficiency	<b>3 &amp; 4</b>	13 <sup>th</sup>	<b>A,B,C &amp;D</b>
10.Transplantation	<b>3 &amp; 4</b>	14 <sup>th</sup>	<b>A,B,C &amp;D</b>
11.Tumor immunology	<b>3 &amp; 4</b>	14 <sup>th</sup>	<b>A,B,C &amp;D</b>
12.Immunotherapy	<b>3 &amp; 4</b>	15 <sup>th</sup>	<b>A,B,C &amp;D</b>
Final Exam		16 <sup>th</sup>	

### **Learning Methodology**

- 1.Lectures
  2. Discussions
  3. Video simulation
  - 4.Practical (tutor presentation followed by students' small group sessions).
  - 5.Independent (Laboratory and home assignments supervised by tutor):
    - a) Writing reports/assignments.
    - b) Preparation of colored posters and slide presentations.
    - c) Group discussion.
  5. computer courseware for independent study can be accessed at the education center beside recently developed web courseware
- Method for disabled students: (no special arrangements are available now, however those student can consult our stuff for help).

## Evaluation

<b>Evaluation</b>	<b>Point %</b>	<b>Date</b>
<b>Midterm Exam</b>	<b>40</b>	<b>7<sup>th</sup> week</b>
<b>Assignments/Quiz</b>	<b>10</b>	<b>11<sup>th</sup> week</b>
<b>Final Exam</b>	<b>50</b>	<b>16<sup>th</sup> week</b>

## **Main Reference/s:**

1. Human Genetics, concepts and applications, Lewis. 2010. ISBN: **0071220046 (pbk.)**
2. Medical genetics (Oxford Core Texts).
3. The Genetic Basis of Common Diseases. Richard A. King, Jerome I. Rotter, and Arno G. Motulsky. 2002. ISBN: **0195125827**
4. Medical genetics at a glance Pritchard, D. J. (Dorian J.) Korf, Bruce R. ISBN: **9780470656549 (pbk.)**
5. Immunology for Medical Students. Roderick Narin and Matthew Helbert. c2007. ISBN: **9780323043311 (pbk.)**
6. Medical Immunology. Parslow, Stites, Terr and Imboden. Lange Medical Books / McGraw-Hill Medical Publishing Division, New York : c2001. 10th ed. ISBN: **0838563007 (pbk.)**
7. Problem-based immunology. Gorczynski, Reginald M. Stanley, Jacqueline. C2006. ISBN: **9781416024163 / 1416024166**

## References:

- 1- Course Notes:  
Lecture and Practical Notes. By staff members
- 2- Facilities Required for Teaching and Learning
  - Audio-visual aids.
  - Intelligent screen
- 3- Medical Genetics, Jorde, Carey, Bamshad and White. Thompson & Thompson Genetics in Medicine. Nussbaum, McInnes and Willard